Observations, taken at Churt, of the Value of Colatitude given by η Ursæ Majoris on the Prime Vertical.

By R. C. Carrington, Esq., F.R.S.

Knowing that the *Nautical Almanac* position of *η Ursæ Majoris* was closely in accordance with numerous observations in the twelve-year and seven-year Greenwich Catalogues, I thought that it would give me a good determination of latitude, if observed in the prime vertical. I had had no previous trial of this method, but my altazimuth is perfectly suited for observation in this position, as in any other. On the 25th of April, 1874, I found that the reading of coincidence of the middle wire, with its image in a trough of mercury, illuminated by a Bohnenberger eye-piece, was

1. W. at Azim.	2. N.	3. E.	4. S.
° ′	° ′	° ′	° ′
173 10	263 10	353 10	83 10
rev.	rev.	rev.	rev.
58·3335	58·3295	58·3160	58·3110

from which I concluded the reading for collimation =0 to be $58^{rev.}\cdot323$, and so set it. The value of the wire being [1″·42941] gave the following corrections for level:

W.	N.	E.	S.
″	″	″	″
+0·24	+0·25	−0·24	−0·25

The value of the wires which will be required below were found to be:

1	2	3	4	5	6	7
[1·63203]	[1·53121]	[1·38947]	[−∞]	[1·38045]	[1·52808]	[1·63850]
s	s	s	s	s	s	s
−42·858	−33·979	−24·517	0·000	+24·013	+33·735	+43·501

and the side wires of *η Urs. Maj.* were computed by the formula given by Encke in the *Berlin Jahrbuch*, for 1843:

$$t'-t = \frac{\text{wire}}{\sin\delta\,.\,\cos\phi\,.\,\sin t} - \frac{1}{2}\cot t\,.\,15\sin 1''\left(\frac{\text{wire}}{\sin\delta\,.\,\cos\phi\,.\,\sin t}\right)^2 + \frac{1}{6}(1+3\cot^2 t)\,(15\,.\,\sin 1'')^2\left(\frac{\text{wire}}{\sin\delta\,.\,\cos\phi\,.\,\sin t}\right)^3;$$

where t for wire 1 in May 29, second observation is, for instance—

h	m	s		h	m	s		h	m	s		°	′	″
14	43	40	−	13	42	31·3	=	1	1	8·7	=	15	17	10·5,

w 1 is [1·63203], $l\sin t = 9{\cdot}42101$, $l\sin\delta = 9{\cdot}80858$, and $l\cos\phi = 9{\cdot}89132$.

The signs require attention; for instance, in the second observation of May 29

The first term of wires 1, 2, 3 is +, and for wires 5, 6, 7 −
„ second „ „ „ −, „ „ −
„ third „ „ „ +, „ „ −,

May 29. *η Ursæ Majoris*, observed at azimuth 263° 4′ 26″·35:

Wires.	h	m	s	Correction. m	s	h	m	s
7	12	31	17·5	+4	53·60 =	12	36	11·10
6	12	32	21·6	+3	49·44 =			11·04
5	12	33	26·5	+2	44·60 =			11·10
4	12	36	10·5	0	0·00 =			10·50
3	12	39	6·3	−2	55·19 =			11·11
2	12	40	16·0	−4	4·96 =			11·04
1	12	41	23·5	−5	11·74 =			11·76
					Mean	12	36	11·09

Same star W. of meridian:

Wires.	h	m	s	Correction. m	s	h	m	s
1	14	43	40·0	+5	11·67 =	14	48	51·67
2	14	44	48·5	+4	4·85 =			53·35
3	14	45	57·5	+2	55·14 =			52·64
4	14	48	52·1	0	0·00 =			52·10
5	14	51	36·3	−2	44·59 =			51·71
6	14	52	42·5	−3	49·35 =			53·15
7	14	53	46·1	−4	53·54 =			52·56
					Mean	14	48	52·45

β Libræ, observed at azimuth 173° 4′ 23″·25:

Wires.	h	m	s	Correction. s	h	m	s
1			24·8	+43·38 =			8·18
2			33·5	+34·39 =			7·89
3			42·4	+24·82 =			7·22
4			8·4	0·00 =			8·40
5			32·6	−24·31 =			8·29
6			42·2	−34·15 =			8·05
7	15	10	52·0	−44·03 =			7·97
				Mean	15	10	8·00

D. Ab.	Level.	Azim.			
s	s	s	h	m	s
+0·00	+0·01	−1·18 =	15	10	6·83

slow +8·69 s

Next I observed *η Ursæ Majoris* on June 1 at azimuth 83°4′31″·90:

Wires.	h m s	Correction. m s	h m s
1	12 30 42·0	+4 46·75 =	12 35 28·75
2	12 31 41·5	+3 49·00 =	30·50
3	12 32 43·1	+2 46·42 =	29·52
4	12 35 30·0	0 0·00 =	30·00
5	12 38 19·8	−2 49·80 =	30·00
6	12 39 30·2	−4 0·65 =	29·55
7	12 40 43·0	−5 13·25 =	29·75
		Mean	12 35 29·72

Same star W. of meridian:

Wires.	h m s	Correction. m s	h m s
7	14 44 13·0	+5 13·29 =	14 49 26·29
6	14 45 26·5	+4 0·65 =	27·15
5	14 46 37·5	+2 49·77 =	27·27
4	14 49 27·0	0 0·00 =	27·00
3	14 52 13·5	−2 46·42 =	27·08
2	14 53 15·5	−3 48·98 =	26·52
1	14 54 14·4	−4 46·77 =	27·63
		Mean	14 49 26·99

β Libræ observed at azimuth 173° 4′ 31″·8:

Wires.	h m s	Correction. s	h m s
1	...	...	...
2	30·4	+34·39 =	4·79
3	39·5	+24·82 =	4·32
4	4·7	0·00 =	4·70
5	29·0	−24·31 =	4·69
6	38·8	−34·15 =	4·65
7	15 10 48·7	−44·03 =	4·67
		Mean	15 10 4·64.

D. Ab.	Level.	Azim.	
s	s	s	h m s
+0·00	+0·01	−1·68 =	15 10 2·97
			s
		slow	+12·56

Next I observed a complete transit of *Polaris* S.P. on June 4, at the same azimuth:

Wires.	h m s	Correction. m s	h m s
7	12 42 6·0	+30 25·4 =	13 12 31·4
6	12 48 55·5	+23 35·6 =	31·1
5	12 55 42·0	+16 47·8 =	29·8
4	13 12 30·0	0 0·0 =	30·0
3	13 29 38·0	−17 8·8 =	29·2
2	13 36 16·0	−23 45·9 =	30·1
1	13 42 36·0	−29 58·4 =	13 12 37·6
		Mean	13 12 31·31

D. Ab.	Level.	Azim.
s.	s	s
+0·55	−0·52	−52·10
h m s		s
=13 11 39·24		slow +13·62

Arcturus, June 4:

Wires.	h m s	Correction. s	h m s
1	58·3	+45·56 =	43·86
2	8·0	+36·12 =	44·12
3	18·0	+26·06 =	44·06
4	44·0	0·00 =	44·00
5	9·6	−25·53 =	44·07
6	19·8	−35·86 =	43·94
7	14 10 30·1	−46·24 =	43·86
		Mean	14 9 43·99

D. Ab.	Level.	Azim.	
s	s	s	h m s
+0·00	+0·14	−1·06	= 14 9 43·07
			s
			slow +13·62

I found the value of azimuth by *Polaris* S.P. and *Arcturus* on June 4 to be $-28''\cdot51$, and accordingly assumed as the N. point all through

° ′ ″
173 4 3·3.

I now apply the data to η *Ursæ Majoris*, and find

N. & E.	N. & W.	S. & E.	S. & W.
h m s	h m s	h m s	h m s
12 36 19·65	14 49 1·12	12 35 42·15	14 49 39·53

and remark that any error of azimuth is annihilated in taking them in pairs E. and W., and any error of level annihilated by taking the pairs N. and S.

Accordingly, May 29, we have as the half difference of ν *Ursæ Majoris*,

h m s ° ′ ″
1 6 20·735 = 16 35 11·01,

and the

° ′ ″
N.P.D. of η *Ursæ Majoris* = 40 3 24·42;

from which we find as the value of ϕ the colatitude, by the common formula $\tan \phi = \cot \delta \,.\, \cos H$,

$$\phi = 38^\circ\ 52'\ 6''.65 \text{ by N.};$$

and from June 1 we have in the same way

$$1^h\ 6^m\ 58^s.69 = 16^\circ\ 44'\ 40''.04,$$

and the

$$\text{N.P.D. of } \eta \textit{ Ursæ Majoris} \text{ being} = 40^\circ\ 3'\ 23''.82,$$

$$\phi = 38^\circ\ 50'\ 19''.69 \text{ by S.}$$

Whence mean of N. and S.

$$\phi = 38^\circ\ 51'\ 13''.17,$$

a result in which I have little confidence, though I know of nothing but mere shifting of the instrument to affect it.

Note on the Polarisation of Coggia's Comet. By A. Cowper Ranyard, Esq.

On the 1st, 2nd, and 4th of July I examined the light of the comet with a double image prism, but could not with *certainty* detect a difference between the brightness of the two images. On the 6th I was for the first time able to satisfy myself that there were undoubted traces of polarisation: the component in excess being that in the plane passing through the Sun's estimated place below the horizon. The difference of brightness was best observed when the double image prism was turned so that the line joining the nuclei of the two images was at right angles to the axis of the tail, that is, at right angles to the line joining the Sun and Comet: 90° from this position the two images partly overlapped, and their relative intensity was not so easily compared; no traces of bands could be made out with a Savart, nor could I perceive any difference in tint between the two fields of a biquartz when placed in the principal focus of a 4-inch telescope, and examined with a Nicol's prism packed amongst the lenses of an erecting eye-piece.

I continued to examine the polarisation of the comet with a double image prism almost nightly until the 14th, and it appeared to me that the difference in the brightness of the two images continued to become more and more conspicuous. This was specially the case with respect to the relative intensity of the two images of the tail; but I should not like to speak with